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A Global Perspective on Effectiveness of Aid for Trade

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Abstract

Recent global initiatives on debt relief and development assistance call for increasing aid for trade to the poorest countries. The paper applies a multi-country computable general equilibrium model to measure the effectiveness of alternative aid for trade categories. The findings show that aid for trade policies expand trade and alleviate international income inequalities in the recipient countries, that will benefit mainly from aid for trade adjustment and technical assistance.

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A GLOBAL PERSPECTIVE ON EFFECTIVENESS OF AID FOR TRADE

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1. Introduction

International trade can be a powerful driver for economic growth, poverty reduction and long term sustainable development. For many developing countries, especially least developed countries, trade related bottlenecks, such as lack of market information, ineffective policies, weak private sector, poor institution and infrastructure, prevent them to integrate and compete in the global market. Aid for trade (thereafter, AfT), launched in 2005 at Hong Kong WTO Ministerial Conference, provides the financial and technical assistance that aims to facilitate the integration of low-income countries into the global economy. In particular, the AfT policy actions include initiatives that reduce transaction costs and enhance productivity in order to expand trade and alleviate inequality in recipient countries (Hoekman *et al.*, 2010). Under the current rapid changing geopolitical environment, multi-dimensional financial crisis and unevenly income distribution, the need for further aid assistance has been widely recognized by multi-donors and the international foreign aid community. The openness to trade is a key ingredient for economic success and for improved living standards, but reductions in trade barriers is not enough. Thus, the aim of aid for trade policies is to help these countries overcome the supply-side and trade-related infrastructure constraints that inhibit their ability to benefit from market access opportunities (WTO/OECD, 2011).

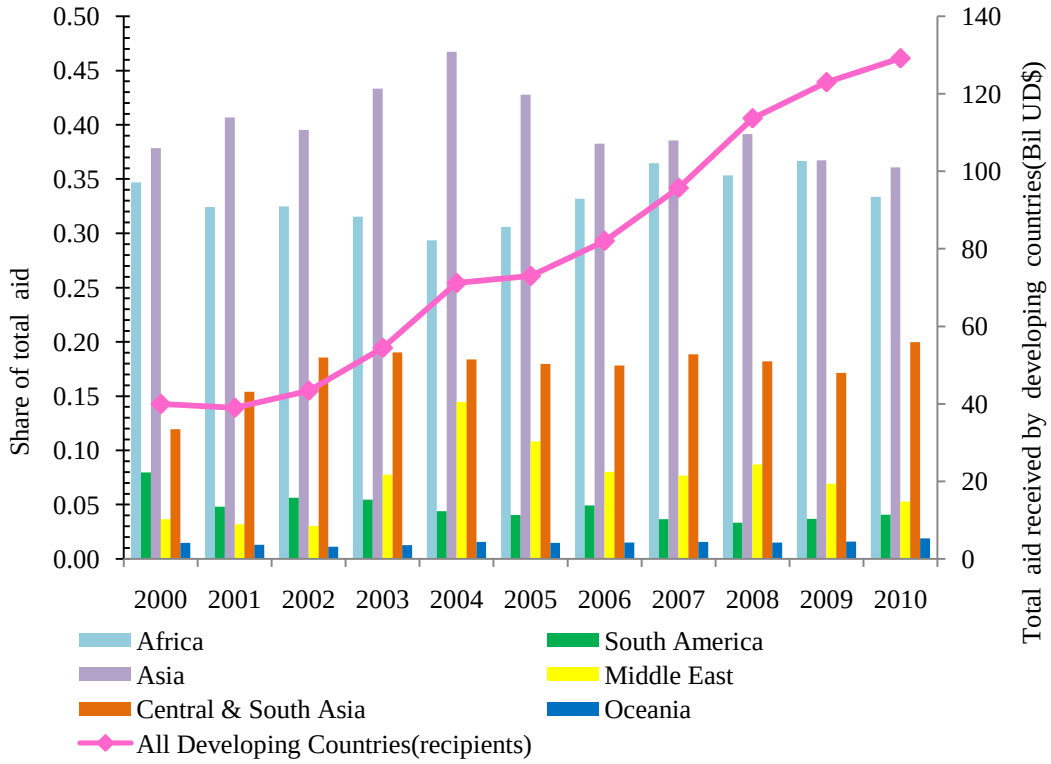
AfT is an integral part of regular official development assistance (ODA). The Organization for Economic Cooperation and Development (OECD) reports continuing growth in ODA. In fact, in 2009, the rise in ODA in real terms was about 7 percent. The largest donors were the United States, France, Germany, the United Kingdom and Japan. Also ODA increased by nearly 30% in real terms between 2004 and 2009, and it is expected to rise by about 36% in real terms between 2004 and 2010. The continued growth in ODA has shown that aid pledges are effective when backed up with adequate resources, political and firm multi-year spending plans. There has also been an emerging consensus that the WTO Doha Round must be coupled with adequate trade-

related assistance to mitigate the detrimental effects of trade reforms and to enhance the trading capacity of developing countries. Specifically, in February 2005, G-7 Ministers called on the World Bank and the International Monetary Fund (IMF) to develop proposals for additional assistance to countries to ease adjustment to trade liberalization and to increase their capacity to take advantage of more open markets. Subsequently, in July 2005 Heads of State at the G8 Summit at Gleneagles agreed to increase help to developing countries to building their physical, human and institutional capacity to trade. In December 2005, at the 6th Ministerial Conference held in Hong Kong, the Ministerial Declaration endorsed the enhancement of the Integrated Framework and created a new WTO work programme on Aid-for-Trade (Hoekman *et al.*, 2010).

Since 2005 donors and development agencies have increased the overall value of AfT and put in place several mechanisms to channel such aid and to ensure that it alleviates inequality. According to the data reported by the OECD, 25 percent of the official development assistance (ODA) was directed toward AfT in 2008. Also OECD statistics show that in 2009, global AfT commitments reached approximately 40 billion US dollars, a 60% increase from the 2002-05 baseline period. Half of all AfT is provided in grant form, mainly to the poorest developing countries. Disbursements have been growing at a constant growth rate of between 11 and 12% for each year since 2006 – reaching 129 billion US dollars in 2010 – indicating that past commitments are being met (WTO/OECD, 2011). The top three developing regions that received the aid from all donors are Asia, Africa and South America respectively in the past decade (Figure 1)[*].

[*] The Aid data set is extracted from OECD.STAT data base. The donors include DAC countries, multilateral agencies, non-DAC countries, G7 countries, DAC-EU members.

Figure 1. Foreign aid distribution to Developing Countries by Region



Source: Our calculation based on OECD.STAT data base.

The literature on AfT is really quite new (e.g. Helble *et al.*, 2009; Hoekman *et al.*, 2010; Calì *et al.*, 2011). In part this is because of data limitation; frequently, because it will be difficult to disentangle the impacts of AfT projects on trade, income and welfare. However, the literature on AfT can be traced back to that on foreign aid, whose role of foreign aid in the growth process and to reduce international inequalities in developing and least developed countries has been a topic of intense debate for several decades. This issue has been analyzed by researchers for decades due to its complexity in nature. It links with political relationship between donor countries and recipient countries, governance of public sector in recipient country, and how much the foreign aid is necessary and how long it should last.

The measurement of effectiveness of AfT, which is the core principle in the Paris Declaration on Aid for Trade, is extremely vital for the recipient countries, because the evaluation of the AfT

impacts would allow policy makers of these countries to have a deep understanding the key issues when they negotiate, design and implement the objectives of AfT. In this context, using a multi-country computable general equilibrium model, the aim of this paper is to analyse AfT policies in terms of effectiveness, which requires that AfT policies achieve their stated goals in the recipient countries. A computable general equilibrium model (thereafter, CGE) describes an economy in equilibrium with endogenously determined relative prices and quantities. Whereas most empirical approaches examine the policy impacts or effects under a ceteris paribus condition, a CGE model, which provides comparative scenarios based on benchmark scenarios, incorporate factor markets, goods markets and external trade markets. Interactions and linkages that take place between these different markets are taken into account. Thus, CGE model allow of evaluating the effects of exogenous shift of policy variables on macroeconomic indicators, such as real GDP, trade balance and welfare. We concentrate our analysis to the main common priorities identified by the donor and recipient countries in the AfT distribution, which are expanding trade and alleviating income inequalities in the poorest countries (WTO/OECD, 2011). The policy design includes four scenarios, which simulate the main AfT categories. In the first scenario, we simulate income transfers from the donor countries to the recipient countries, where we assume that AfT transfers are not constrained to any project or public expenditure. In the other three scenarios the AfT transfers are constrained to reduce trade margins, to increase factor productivity and investments in the recipient countries.

The novelties of this paper are mainly two-fold. Firstly, this is an empirical analysis that it is not limited to one country, but allows of comparing the AfT effects among key aid recipients, which provides us an overview picture of effectiveness of AfT from global perspectives. Secondly, we compare all the ODA categories or instruments in support of trade proposed in the international debate, such as trade adjustment assistance (TAA), institutional reforms(IR), technical assistance and capacity building (TA & CB) and economic infrastructure (EI) and integrate these

instruments with global economy using more recent data, which no other literature have done so. Our findings show that AfT policies expand trade and alleviate inequalities in the recipient countries, which benefit mainly from aid for trade that supports these countries with any transitional adjustment costs from liberalization and increases factor productivity.

2. Literature Review

The literature on AfT can be related to that on foreign aid, which has produced quite different views. On the one hand, the process of foreign aid may deviate from its original purpose or objective due to various factors in each stage of foreign aid creation, implementation, grant distribution and monitoring system between donors and recipient countries. Bauer (1975) regards foreign aid as a failure for recipient countries defining foreign aid as "a transfer of resources from the taxpayer of a donor country to the government of a recipient country". Thus, foreign aid destroys economic incentives, and leads to misallocation of scarce resources and rent seeking, and finally reduces recipient countries economic growth. Based on both the history and the evidence on foreign aid, Easterly (2003) shares similar view as Bauer (1975) questioning about the alternative definition of "aid" "good policy" and "growth" to illustrate the complex relationship between foreign aid and growth and the high possibility of failure. On the other hand, we would find a large number of studies supporting foreign aid. The endogenous growth model developed by Rosenstein-Rodan (1943) supports foreign aid. The idea beyond this model is that lack of sufficient investment or physical capital would hurdle economic growth; however, foreign aid provides investment capital, which would generate income and raise up the return to capital and promote economic growth. Burnside *et. al* (2000) and Collier (2002) argue that foreign aid promote growth only in good policy environment. Ang (2010) finds that while foreign aid exerts a direct negative influence on output expansion, its indirect effect via financial liberalization is positive. Dalgaard *et al.* (2001) suggest that there is a linear effect between the aid-growth relationship due to diminishing returns to foreign aid. Dollar *et al.* (2001) suggest

that good policies package such as private property rights, fiscal discipline, macroeconomic stability, and open to trade on average increase the income of the poor. Furthermore, there are some studies that found ambiguous or mixed relationship between foreign aid and growth. Bourguignon *et al.* (2007) argue that the empirical literature on aid effectiveness has yielded unclear and ambiguous results. The "black box", which is the linkage from donors to policy makers, from policymakers to policies and from policies to outcomes, makes it difficult for researchers to quantify and open it. Rajan *et al.* (2005) find no robust positive relationship between aid and growth by using cross-country panel data. Ekanayake *et al.* (2010) find mixed effect of foreign aid on economic growth in developing countries. Werker *et al.* (2008) argue that foreign aid affects most components of GDP, but it has no statistically identifiable impact on prices or economic growth. Inanga *et al.* (2008) conclude that foreign aid finance can generate economic growth if effectively utilized in a stable macroeconomic environment. Finally, Holder (2004) argues that the relationship between foreign aid and growth turns out to be an inverted-U shaped under reasonable policy assumption, which is an Aid Laffer Curve. Positive relationship between foreign aid and growth is located in the upward sloped side of the Aid Laffer Curve, while the negative relationship is located at the downward sloped side of the Aid Laffer Curve.

The importance of AfT for the low income countries can be related also to the relationship between trade and economic growth. We would find a large number of theoretical and empirical studies that have examined this relationship. Main survey studies are Anderson *et al.* (1996) and Greenaway *et al.* (1994). Winters *et al.* (2000) carry out a theoretical analysis of the relationship between trade measures and their impact on poverty using both simple forms of static, and short and long term dynamic analysis. He identified a number of possibilities of both pro- and anti-poor influences and state that the effects of trade on poverty are likely to be positive providing a view about how trade liberalization can be designed to foster poverty alleviation. Balassa (1978) investigates the relationship between exports and economic growth for eleven developing

countries. Statistical evidences were provided subsequently in several studies. Furthermore, there have been some studies which have provided important insights on how international trade liberalization influences economic growth, such as Feder (1982), Levine *et al.* (1992) and Wacziarg (2001). According to these studies, trade impacts on growth through creating new investments, positive external effects, technology transfers, inflow of foreign direct investments, productivity growth, etc.. A paper by Cockburn, Decaluwé and Robichaud (2005) draws on lessons on the impacts of trade liberalization on growth, poverty and inequality in seven Asian and African countries. The paper concludes that trade liberalization has positive, although generally small, effects on growth and poverty reduction occurs in most countries.

3. Modeling framework

In order to assess the systematic general-equilibrium effects of AfT we use a multi-country (Computational General Equilibrium) CGE model, labeled AIDCGEM, which is a modified version of the standard GTAP model (Hertel, 1997).

The CGE model is a comparative static, multi-commodity, multi-region model with the assumptions of perfect competition, market equilibrium and open economy.

On the consumption side, the economy is modeled by a representative household in each region *r*, whose Cobb-Douglas utility function allocates expenditures between private consumption (C), government consumption (G) and savings expenditure (S) as follows:

$$U_r = C_r^{\alpha_{C,r}} G_r^{\alpha_{G,r}} S_r^{\alpha_{S,r}} \qquad (1)$$

with $\alpha_{C,r}$, $\alpha_{G,r}$ and $\alpha_{S,r}$ income shares and $\alpha_{C,r} + \alpha_{G,r} + \alpha_{S,r} = 1$.

The constrained optimizing behavior of the household in region *r* for private consumption is represented by a non-homothetic Constant Difference of Elasticity (CDE) expenditure function for the set of goods and services. A Cobb-Douglas sub-utility function is employed for government spending. In this case the expenditure shares are constant across all commodities.

Private and government consumption are split in a series of alternative composite Armington aggregates (Armington, 1969).

On the production side, the producers receive payments for selling consumption goods to the private households and the government, intermediate inputs to other producers and investment goods to the savings sector. Under the zero profit assumption, these revenues must be precisely exhausted on expenditures for intermediate inputs and primary factors of production. The nested production technology exhibits constant returns to scale and every sector produces a single output. The technology is simplified by employing the Constant Elasticity of Substitution (CES) functional form:

$$\boldsymbol{y_{i,r}} = \left(\sum_{\mathbf{j=1}}^{\mathbf{n}} \boldsymbol{\theta_j x_{j,r}^{1-\frac{1}{\sigma}}} \right)^{\frac{\sigma}{\sigma-1}} \quad (2)$$

where, in region r, $y_{i,r}$ is the production of the good i, $x_{j,r}$ is the input j, θ_j is a non-negative parameter, with $\sum_{j=1}^{n} \boldsymbol{\theta_j} = \mathbf{1}$, and σ is the elasticity of substitution.

Both intermediate and final products from different regions are considered to be imperfectly substitutable with each other (Armington, 1969). All factor inputs (land, labor, capital and natural resources) are assumed to be fully employed and immobile across regions. Capital and labor are perfectly mobile across sectors and, hence, they earn the same market return regardless of where they are employed; land and natural resources are sluggish to adjust and their returns may differ across sectors.

Differently to the original GTAP model, in the AIDCGEM model, we adopt the assumption of no full employment and a labour supply curve has been added and modelled, which specifies the relation between labor supply and the real wage:

$$\boldsymbol{L = L^S \left(\frac{W}{P} \right)} \quad (3)$$

A description of modeling the labour supply function appears in the Appendix.

Savings are exhausted on investment and capital markets are assumed to be in equilibrium only at the global level. If savings exceed investments for one country, then it has a trade surplus; otherwise, it has a trade deficit. A hypothetical world bank collects savings from all regions and allocates investments so as to achieve equality of changes in expected future rates of return:

$$\Delta\boldsymbol{\eta_r} = \Delta\boldsymbol{\eta} \quad (4)$$

where $\Delta\boldsymbol{\eta_r}$ and $\Delta\boldsymbol{\eta}$ are the percentage change, respectively, in region's rate of return and global rate of return.

Every economy includes government interventions. Private households and the government not only spend their available income on consumption goods, but also pay taxes to the regional household. In the case of the government, taxes consist of consumption taxes on commodities. In the case of private household, taxes consist of consumption taxes and income tax net of subsidies. The firms have to pay taxes to the regional household. These value flows represent taxes on intermediate inputs and production taxes net of subsidies. Also trade generated tax revenues and subsidy expenditures are included in the GTAP model. All taxes levied in the economy always accrue to the regional household.

AfT policies implies that donors transfer income to the recipient countries. In the AIDCGEM model this element is inserted into the equation computing the national income as the total value of all domestic primary resources. Thus, let AID_r be the AfT transfer in region *r*, the regional income is equal to:

$$\boldsymbol{Y_r} = \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{P_{i,r}E_{i,r}} + \boldsymbol{T_r} + \boldsymbol{AID_r} \quad (5)$$

where $E_{i,r}$ is the endowment *i* and $P_{i,r}$ is the market price of the endowment *i*. The AfT transfer will increase (decrease) the regional income of the recipient (donor) country. To be consistent with general equilibrium conditions, the algebraic sum of all income transfers introduced in the model equations must be zero. This ensures that the redistribution of income is globally neutral and that income shocks have the same sign as demand shocks.

Furthermore, in the AIDCGEM model, investment has been fixed exogenously such that the endogenous change of the capital goods demand, $\Delta \boldsymbol{K_r^D}$, must be equal to the endogenous change of the capital goods output, $\Delta \boldsymbol{K_r^S}$, and to the exogenous change of the regional investment, $\Delta \boldsymbol{I_r^S}$. Thus, the following two equations must be satisfied to obtain the equilibrium for capital goods market:

$$\Delta \boldsymbol{K_r^D} = \Delta \boldsymbol{K_r^S} \tag{6}$$

$$\Delta \boldsymbol{K_r^D} = \Delta \boldsymbol{I_r^S} \tag{7}$$

To ensure the equalization of global savings and investment, an endogenous adjustment of regional saving has been set up assuming that all regional investments increase by the same percentage. In this way, the assumption of perfect international mobility of capital is respected.

Finally, two representative international income inequality measures (coefficient of variation and Atkinson's index) have been introduced in the AIDCGEM model.

The coefficient of variation is calculated as the sum of income squared deviations:

$$c = \frac{\sqrt{\frac{1}{n}\sum_{r=1}^{n}(y_r - \bar{y})^2}}{\bar{y}} \tag{8}$$

where $\bar{\mathbf{y}}$ is the regional mean income. The procedure of forming the square places more weight on income that are further away from the mean.

The Atkinson's index is defined by

$$A = 1 - \frac{MEDE}{\bar{y}} \tag{9}$$

where MEDE is the equally distributed equivalent income.

These two measures of income inequality have been chosen with respect to others, because they respect all of the following properties: (a) weak principle of transfers; (b) scale independence; (c) principle of population; (d) decomposability. The income inequality measures are summary

indices, that are explained within the model and their values are endogenously changed (determined).

4. Data Source and Model Calibration

In the CGE models, a set of mathematic equations translates the structure of an economy and describes the behaviour of all agents and the equilibrium conditions of all markets. A calibration procedure fixes the parameters for the model's equations (called benchmark equilibrium) and, then the model can be solved for an alternative scenario associated with any changed policy regime. A comparison between the counterpart or comparative scenario and the benchmark scenario makes it possible to assess effects on allocation and income distribution. CGE model is designed to analyze "What if " question. For example, what is the impact of foreign aid ($1000 million US dollars) on receipt country's income, output, welfare and other key economic indicators? The second advantage of CGE model is that it catches the sectoral and regional linkage effects. While partial equilibrium model are unable to provide the overview of the counterpart scenarios.

The AIDCGEM model is calibrated for the year 2001 using the GTAP data base, version 6 and foreign aid data is mainly extracted from OECD STAT[*].

GTAP data base, around which the model has been built, is a cross-section data of international trade flows and national input-output tables. All the information in the data base is reported in values converted to US dollars. The behavioral parameters utilized in the GTAP model are described in Dimaran *et al.* (2006). They define the magnitude of behavioral responses to changes in relative prices. In particular, there are four sets of behavioural parameters in GTAP data base: (i) elasticities of substitution, in both consumption and production; (ii) transformation

[*] Foreign aid data set is extracted from OECD STAT
(Available at http://www.oecd.org/document/21/0,3746,en_2649_34665_43230357_1_1_1_1,00.html)

elasticities, that determine the degree of mobility of primary factors across sectors; (iii) the flexibilities of regional investment allocation; (iv) consumer demand elasticities.

The GTAP data base, version 6, includes 87 regions and 57 commodities. For our analysis, the regions are aggregated from 87 regions to 16 regions. The regional aggregation has been selected primarily based on importance in the world production, consumption, international trade, economic development and geographic location. Thus, the regional aggregation includes five donor countries and eleven recipient countries (Table 1).

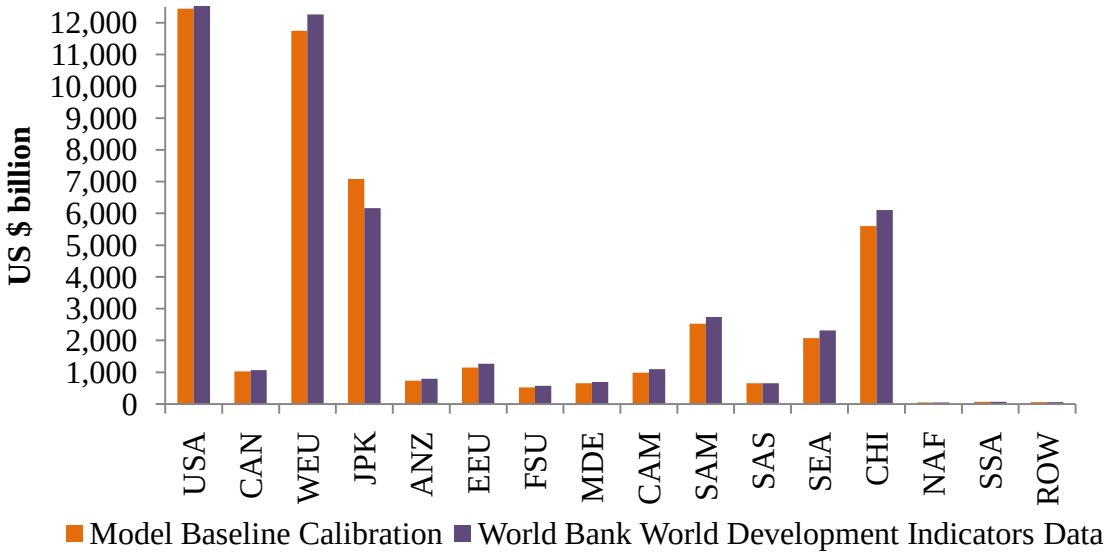
Table 1. Regional aggregation

Acronym	Region	Type
USA	**United States**	*Donor*
CAN	**Canada**	*Donor*
WEU	**Western Europe** (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom)	*Donor*
JPK	**Japan and South Korea**	*Donor*
ANZ	**Australia, New Zealand and Oceania**	*Donor*
EEU	**Eastern Europe** (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithunia, Malta, Poland, Romania, Slovakia, Slovenia)	*Recipient*
FSU	**Former Soviet Union**	*Recipient*
MDE	**Middle East** (Turkey, Rest of Middle East)	*Recipient*
CAM	**Central America** (Mexico, Central America, Carribean)	*Recipient*
SAM	**South America** (Colombia, Perù, Venezuela, Rest of Andean Pact, Argentina, Brazil, Chile, Uruguay, Rest of South America)	*Recipient*
SAS	**South Asia** (Bangladesh, India, Sri Lanka, Rest of South Asia)	*Recipient*
SEA	**Southeast Asia** (Taiwan, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam)	*Recipient*
CHI	**China** (China, Hong Kong)	*Recipient*
NAF	**North Africa** (Morocco, Rest of North Africa)	*Recipient*
SSA	**Sub-Saharan Africa** (Botswana, Rest of SACU, Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, Other Southern Africa, Uganda, Rest of Sub-Saharan Africa)	*Recipient*
ROW	**Rest of the world**	*Recipient*

Source: Authors' modelling aggregation based on GTAP data base

As the GTAP 6 data base contains data for 2001, but the AfT policies is designed for the year 2010, we follow the methodology described in Arndt *et al.* (1997) to provide a status quo projection of the global economy in the selected year. The approach is based on a two-stage procedure. Firstly, we have generated "pseudo-calibration" from 2001 to 2010 by calibrating the technical parameters related to population growth, capital and labour stock change, labour and land productivity change, so that we achieve growth in regional GDP consistent with the World Bank projections. Figure 2 shows the convergence results to the real data in terms of GDP. The resulting scenario in this first stage is called "baseline". Subsequently, conventional comparative analysis is conducted simulating the AfT scenarios for 2010.

Figure 2. Gross domestic product (GDP) convergence



Source: Our calculation from World Development Indicators & authors' modeling results.

5. Modeling Policy Scenarios

In this section we present four policy scenarios, which have been constructed such that to include the AfT categories identified by the Task Force on Aid for Trade (WTO, 2006). The AfT policy scenarios are carried out as comparative static analysis in variables that are exogenous in the closure of the model. Table 2 reports the description of the policy scenarios.

Table 2. Scenario Design and Instrument Description

Scenario	*AfT policy Intervention for the recipient countries*	*AfT Policy Impacts*
1. Trade adjustment assistance(TAA)	*Increase in the aid budget*	- Donor countries: negative Income transfer - Recipient countries: Unconstrained positive income transfer
2. Institutional reform (IR)	*Reduce transaction costs & introduce quality assurance*	-Donor countries: Negative Income transfer - Recipient countries: Constrained positive income transfer for reducing export tax
3.Technical assistance & capacity building (TA &CB)	*Update the production processes, access market information and improve efficiency*	- Donor countries: Negative Income transfer - Recipient countries: Constrained positive income transfer for raising efficiency for all factors
4. Economic Infrastructure	*Improve infrastructure*	- Donor countries: Negative Income transfer - Recipient countries: Constrained positive income transfer for raising investments

Source: Authors' modelling Design

The first scenario, called "trade adjustment assistance", involves fiscal support and policy advice to help countries cope with any transitional adjustment costs from liberalization. This scenario implies an income transfer from the donors to the recipient countries. The exogenous shocked variable in the AIDCGEM is the AfT transfer (AID_r) in region *r*. The AfT transfer is not constrained, that is, it is not related to any project or public expenditure in the recipient countries. The aid for trade data comes from OECD.STAT data base. The amount of aid for

trade is equal to the 25 percent of the Official Development Assistance (ODA). Table 3 reports the AfT distribution applied in each scenario.

Table 3. Aid for trade distribution

Donor	*Income transfer (US $ million change w.r.t. baseline scenario)*
United States	-3998.94
Canada	-3617.13
Western Europe	-4240.08
Japan	-4300.37
Australia, New Zealand & Oceania	-3938.65
Recipient	
Eastern Europe	742.63
Former Soviet Union	342.94
Middle East	3271.26
Central America	1606.96
South America	1635.11
South Asia	2959.25
Southeast Asia	1684.83
Mainland China	482.96
North Africa	492.5
Sub-Saharan Africa	6209.75
Rest of the World	667

Source: Modeling results based on OECD.STAT and GTAP data base

In the other three scenarios, the amount of AfT transfer is unchanged with respect to the first scenario, but the AfT is now constrained for the recipient countries. In fact, the second scenario, called "institutional reforms", is designed to reduce transaction costs and introduce quality assurance such that the demand for exports expands. This is simulated through an AfT transfer by donors countries which reduces their income. This income transfer is used to reduce the export tax revenues for the recipient countries. The third scenarios, called "technical assistance and capacity building", aims to improve the productivity of factors, through supplying training and awareness of production process. This is simulated by an AfT transfer by donors countries which

reduces their income and by using this income transfer for augmenting the productivity for all factors in the recipient countries. The fourth scenario, called "Infrastructure", involves infrastructure improvements, widespread throughout the economy. This is simulated by an AfT transfer by donors countries, which reduces their income and by using this income for increasing investment in the recipient countries. Table 4 reports the details of the shocks applied in these three scenarios in the recipient countries. The shocks in terms of AfT transfer for the donor countries are unchanged and equal to those reported in table 3.

Table 4. Effectiveness of Aid for Trade on Different Scenarios (w.r.t. baseline)

Region/Country	*Institutional Reform (IR) scenario:*	*Technical assistance & capacity building scenario:*	*Economic Infrastructure scenario:*
	Export tax Revenues (US $ million)	*Factor Productivity (%)*	*Investment (%)*
Eastern Europe	-3.85	0.08	0.05
Former Soviet Union	-342.94	0.08	0.09
Middle East	-1408.37	0.63	0.74
Central America	-1273.37	0.19	0.21
South America	-1635.11	0.07	0.07
South Asia	-2959.25	0.61	0.54
Southeast Asia	-1684.83	0.09	0.07
China	-482.96	0.01	0
North Africa	-492.5	1.29	1.11
Sub-Saharan Africa	-0.06	10.2	12.43
Rest of the World	-34.24	1.26	1.53

Source: Modeling results based on OECD.STAT and GTAP data base

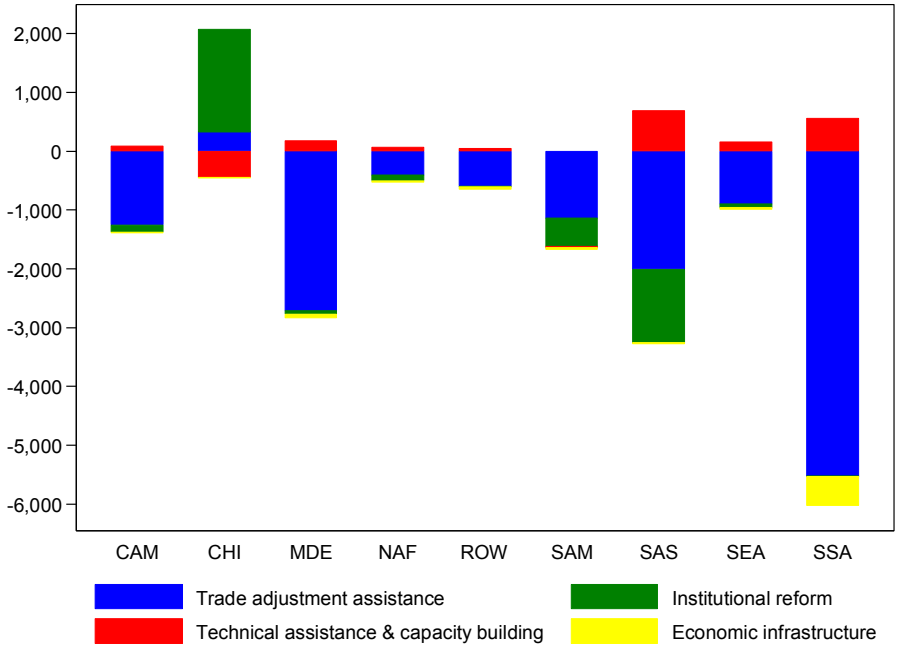
6. Modeling results

Effectiveness requires that AfT policy achieves its stated goals. Following the WTO/OECD report (WTO/OECD, 2011), the common priorities between donor and recipient countries are to expand trade and, jointly, to alleviate inequalities. We use trade balance, computed as total exports less total imports as trade indicator; whereas, welfare and income indicators are

employed to evaluate inequalities. We compute the equivalent variation as money metric measure of economic welfare. Income is defined as the service value of national primary factors, which are in the AIDCGEM model natural resources, land, labor and capital. Furthermore, the coefficient of variation and the Atkinson index, computed respectively as defined in eq. (8) and (9), have been used for the analysis of international income inequality.

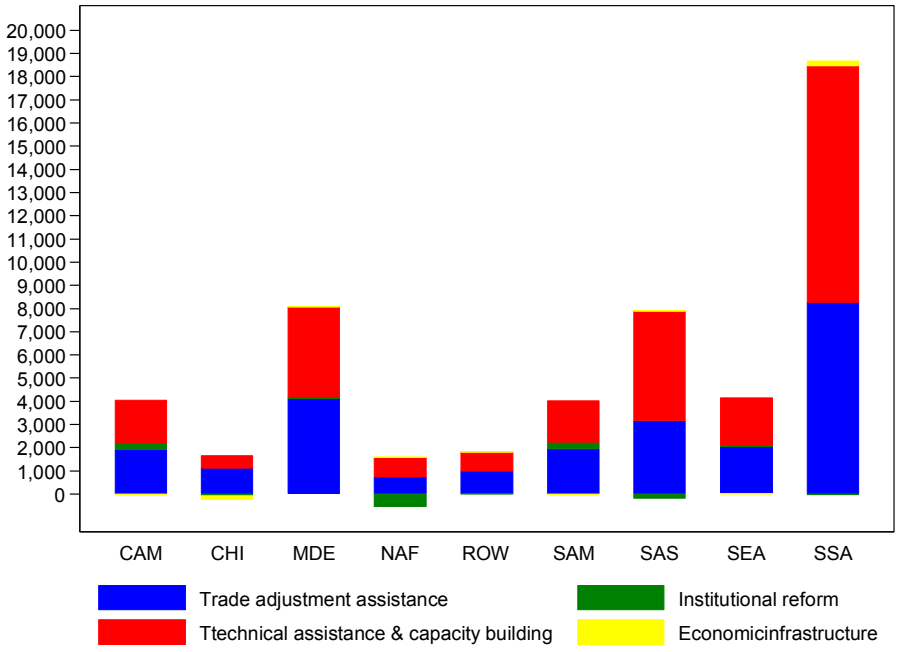
In terms of trade, Figure 3 shows that China (CHI) substantially gains from the institutional reform scenario; South Asia (SAS) and Sub-Saharan Africa (SSA) have moderate gains with the technical assistance and capacity building scenario. Usually, the effects on trade balance yield opposite effects on welfare. In other words, trade adjustment assistance reduce transaction cost of almost all countries or regions (except China) compared with its base line value. China's trade surplus is big enough to offset the transaction cost; Trade adjustment assistance scenario yields the highest positive effects on welfare scenario for almost all the countries (Figure 4). The magnitude of trade and welfare effects may differ, due to the fact, that the effects on welfare change are not limited to terms of trade, but include endowment, technical efficiency, allocative efficiency and income contributions. In fact, if on the one hand, technical assistance and capacity building scenario have positive trade effects for South Asia (SAS) and Sub-Saharan Africa (SSA); on the other hand, they yield high positive effects on welfare, because the negative contribution to welfare change in terms of trade is compensated by the high positive contribution to welfare change of allocative effects. The welfare effects of the other two scenarios (institutional reform and economic infrastructure) are very small. The results in terms of welfare are reported in Figure 4. The effects on income per capita are mainly positive, but very small, except for Sub-Saharan Africa (SSA), that has substantial positive change in the trade adjustment assistance and technical assistance and capacity building scenarios (Figure 5). This result is due to the fact that the Sub-Saharan African countries receive the significant amount of aid for trade, that yields high income and allocative effects on welfare change.

Figure 3. Trade balance (change w.r.t baseline scenario)



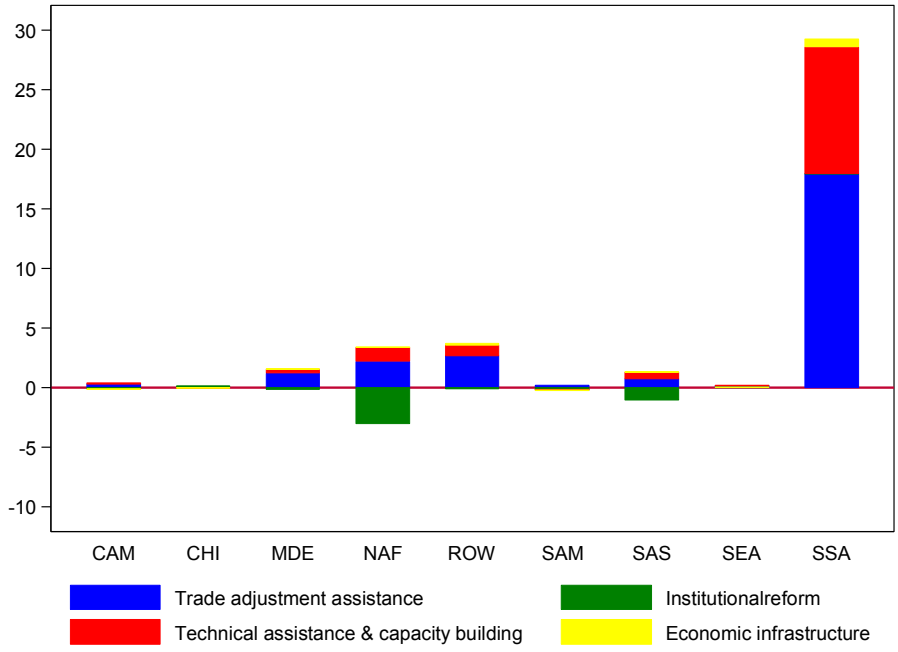
Source: Authors' Modeling Results; Note: Trade balance = Exports-Imports

Figure 4. Welfare effects (change w.r.t baseline scenario)



Source: Authors' Modeling Results

Figure 5. Income per capita (change w.r.t baseline scenario)



Source: Authors' Modeling Results

Table 5 reports the most preferred scenario per indicator for every recipient countries or regions. A combination of the adjustment trade assistance and technical assistance and capacity building scenarios would guarantee the effectiveness more than the other scenarios for all the countries Institutional reform will be more effective in China compared with other scenarios to alleviate income inequalities.

Both trade adjustment assistance (TAA) and technical assistance and capacity building (TA & CB) scenarios are also enforced at international level. In both these scenarios, the international income inequalities, which computed by the coefficient variation and the Atkinson's index decrease, implying that AfT effectiveness occurs in redistributing income from the richest to the low income countries. The opposite effect occurs for the institutional reform and infrastructure scenarios (Figure 6).

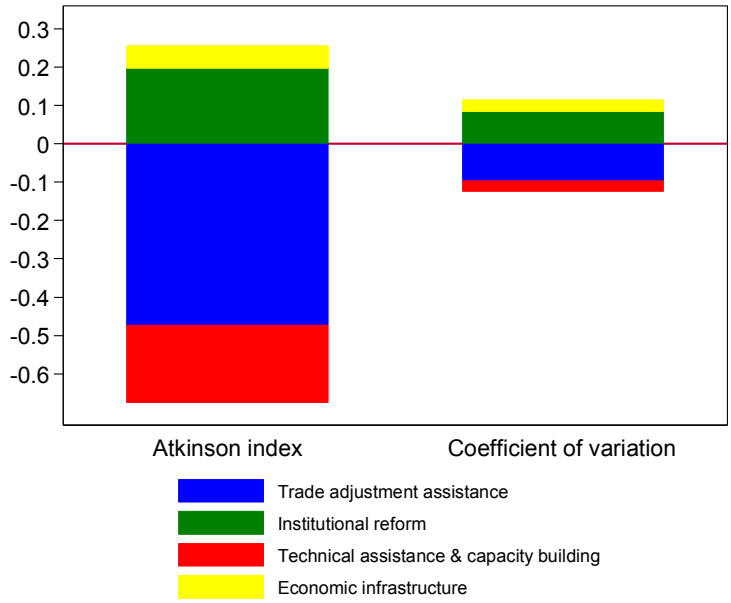
Table 5. Scenario Ranking in terms of Effectiveness for Each Aid Receipting Countries or Regions*

Region	*Trade Balance*	*Welfare*	*Income Per Capita*
Middle East	TA & CB	TAA	TAA
Central America	TA & CB	TAA	TAA
South America	TA & CB	TAA	TAA
South Asia	TA & CB	TA & CB	TAA
Southeast Asia	TA & CB	TAA	TAA
China	IR	TAA	TAA
North Africa	TA & CB	TA & CB	TAA
Sub-Saharan Africa	TA & CB	TA & CB	TAA
Rest of the World	TA & CB	TAA	IR

Source: Modeling results based on OECD.STAT and GTAP data base

Note * TA & CB stands for technical assistance and capacity building, TAA stands for trade, Adjustment assistance, IR stands for institutional reform

Figure 6. International income inequality index (change with respect to benchmark scenario)



Source: Authors' Modeling Results

7. Concluding remarks

Recent global initiatives on debt relief and development assistance call for increasing aid for trade to the poorest countries. Aid for trade is financial and technical assistance that facilitates the integration of low-income countries into the global economy.

Differently to the existing abundant studies regarding to foreign aid, using a multi-country computable general equilibrium model, this paper attempts to provide a global perspective on effectiveness of AfT. We use three indicators (trade balance, welfare and income) to measure AfT effectiveness. Our findings show that AfT policies expand trade and alleviate inequality across the regions. Different regions are affected differently by AfT policies. The aid recipient countries, such as Sub-Saharan and South Asia countries, benefit mainly from aid for trade assistance that helps them with any transitional adjustment costs from liberalization and increases factor productivity.

Indeed, the objectives, priorities and strategies of AfT policies may changed from time to time, the spirit of aid for trade based on humanitarian support and moral obligation will continue prevalent in the future. This trend has been reflected by the amount of foreign aid that has been expanded over decades despite of recent global financial crisis (WTO/OECD, 2011). The policy implication of this paper suggests that the effectiveness of AfT policies varies by instruments of policy implementation and by region. Generally, trade adjustment assistance and factor productivity will be the critical challenges for achieving the objectives of AfT policy.

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Appendix

Let S_r be the labor supply, it is modeled as function of the real wage

$$S_r = a_r - \frac{b_r}{w_r} \tag{A.1}$$

where a_r is an asymptote, which can be interpreted as the maximal potential amount of available unskilled labour force, and b_r is a positive parameter. The labor supply elasticity in region r, ε_r in respect to the real wage, is equal to:

$$\varepsilon_r = \frac{b_r}{a_r w_r - b_r} \tag{A.2}$$

Given that the unemployment rate in region r, u_r, is equal to

$$u_r = 1 - \frac{S_r}{a_r} \tag{A.3}$$

the labour supply elasticity can be also expressed as function of the unemployment rate as follows:

$$\varepsilon_r = \frac{u_r}{1 - u_r} \tag{A4}$$